

ARIZONA DEPARTMENT OF TRANSPORTATION  
INTERMODAL TRANSPORTATION DIVISION  
STATEWIDE PROJECT MANAGEMENT GROUP

PART B:  
  
DICTIONARY  
OF  
STANDARDIZED WORK TASKS

June 30, 2009

## TABLE OF CONTENTS

SECTION		
170	Schedule	4
171	Project Schedule	4
172	Project Schedule Updates	4
173	Progress Meetings	4
200	DESIGN REFERENCES	4
220	AASHTO Publications	5
400	DESIGN WORK PERFORMED BY CONSULTANT	5
402	Partnering Process	5
405	AASHTO Design Criteria Report	5
410	Surveys	6
411	Photogrammetry and Mapping	7
415	Materials Design	9
416	Geotechnical Investigation	9
417	Earthwork	11
418	Special Materials	12
419	Pavement Design	12
420	Environmental Studies	12
425	Public Information Meetings and Public Hearings	13
430	Utilities and Railroads	14
431	Utilities Conflicts and Adjustments	16
432	Utility Plans	18
433	Utility Relocations and Adjustments	18
434	Utility Special Provisions and Clearance Letter	19
435	Establishing Utility Service Connection	20
440	Roadway Design	21
445	Roadway Drainage	23
446	Roadway Drainage Reports	23
447	Roadway Drainage Designs	23
448	Section 404 Permit	24
449	Evaluation of Alternative Pipe Culvert Materials	24
450	Landscape Architectural Practice and Design	24
455	Bridge Design	25
456	Bridge Selection Report	25
457	Bridge Hydraulics Report	26
460	Traffic Engineering Design	26
461	Traffic Engineering Study	26
462	Traffic Control Plans	27
463	Intersection Signalization and Roadway Lighting	28
464	Signing Plans	28
465	Pavement Marking Plans	29

466	Intelligent Transportation Infrastructure	29
470	Right-of-Way	29
471	Right-of-Way Requirements Determination	29
472	Right-of-Way Acquisition	30
473	Temporary Entry Documents	30
480	Cost Estimates	31
485	Specifications	31
486	Special Provisions	31
487	Contracts and Specifications Process	31
490	Computer Aided Design and Drafting (CADD) Standards	32
600	POST DESIGN SERVICES	36
700	MATERIALS FURNISHED BY ADOT	36
710	Surveys	36
711	Photogrammetry and Mapping	37
720	Materials Investigation	37
730	Record Documents	37
740	Traffic Data	38
750	Environmental Studies	38
760	Base Sheets	38
770	Final Design Concept Report	38
1000	CONTRACT ADMINISTRATION	39
1010	Arizona Department of Transportation	39
1020	Consultant	39
1021	Project Control	40
1022	Subcontract Services	40
1023	Project Related Correspondence	41
1024	Quality Control	41
1025	Quality Control Plan Requirements	41
1026	Consultant Personnel	42
1027	Site Visit	42
1030	Acceptability of the Work	43
1040	Design Documentation	43
1050	Value Analysis	44
1051	Value Analysis Team	44
1052	Design Team Responsibilities	44
1060	Reviews and Submittals	45
1061	Environmental Reports - N/A	46
1062	Stage I Design Submittal	46
1063	Stage II Design Submittal	46
1064	Stage III Design Submittal	47
1065	Stage IV Submittal	48
1066	Final Submittal	50

## **PART B: DICTIONARY OF STANDARDIZED WORK TASKS**

### **170 Schedule**

Unless described in the scope of work, the consultant shall develop a plan for the design and pre-construction activities necessary for delivering the project in a timely manner consistent with the length of service. The plan shall include a list of activities, estimated duration and resources as well as a Critical Path Method (CPM) schedule and other information as appropriate.

The consultant shall provide a schedule of major project milestones for developing the plans from Stage II to bid advertisement.

### **171 Project Schedule**

Unless described in the scope of work, the consultant shall provide a CPM schedule compatible with ADOT's Primavera scheduling system. It shall include the milestones/flags requested by ADOT. An initial schedule shall be submitted within 6 weeks of the notice to proceed. The schedule submitted shall be customized to reflect the exact needs of the project. Work elements for which ADOT has responsibility shall be included in the schedule.

### **172 Project Schedule Updates**

Unless described in the scope of work, the consultant shall status activities in the schedule in accordance with a schedule furnished by ADOT. Changes to the schedule logic will be submitted to the ADOT project manager for approval. If the milestones show negative float, the consultant shall include a narrative of corrective solutions to put the design schedule back on time for delivery.

### **173 Progress Meetings**

Unless described in the scope of work, the consultant shall plan to schedule and attend progress meetings during the duration of the project; these meetings include, but are not limited to, the kick-off meeting, monthly progress meetings unless otherwise specified by the project manager and coordination meetings with the technical groups and other stakeholders. The consultant shall record notes of the meetings; these notes shall be distributed to the project manager and/or other team members, as specified by the project manager, within 10 calendar days of the meeting.

## **SECTION 200 - DESIGN REFERENCES**

Design references developed and published by ADOT and other agencies and adopted by ADOT for use in the design of this project are listed in the ADOT Project Development Process Manual (2008 ed., online), AASHTO LRFD Bridge Design Specifications (2007), MUTCD (2003 Ed.), ADOT Traffic Control Design Guidelines, Signing and Marking Standards (2004), Traffic Signal and Lighting Standards (2004) and the ADOT Roadway Design Guidelines (Jan. 2007). The following are current or latest edition of Manuals, Guidelines or Policies that may be required by the consultant for Landscape Architecture on projects: A Policy on Geometric Design of Highways and Streets, AASHTO (2004); Roadside Design Guide AASHTO (2006); ADOT Guidelines For Highways on Bureau of Land Management and U.S. Forest Service Lands (2008); ADOT Landscape Design Guidelines for Urban Highways; ADOT Erosion and Pollution Control Manual for Highway Design and Construction (2005); ADOT Post-Construction Best Management Practices Manual for Highway Design and Construction (2008); ADOT Roadway Design Guide (2007); ADOT Maintenance and Facilities Best Management Practices Manual (2008); Application Procedures for Designation of Parkways Historic and Scenic Roads In Arizona (1993); ADOT CADD Standards & Specifications. For Local Government projects, refer to the Local Government manual.

The Consultant is advised that while possession of all of these documents is not necessary to successfully complete the project, the Consultant is responsible for designing in accordance with the applicable documents, current revisions, amendments and supplements thereto. The selected design Consultant is advised to use the documents that were produced for the project and available to them.

## **220 AASHTO Publications**

ADOT references and publications shall control the work, and any necessary supplementation should be provided by appropriate AASHTO and/or FHWA references. The ADOT Project Manager will provide guidance and direction.

## **SECTION 400 - DESIGN WORK PERFORMED BY CONSULTANT**

For all State projects, the Consultant shall be responsible for providing the engineering services required to accomplish the work products identified in the Project Scope of Work. The services may include the tasks of data preparation, data interpretation, and document preparation including scoping documents, reports, corridor management plans, contract plans, special provisions, construction estimate, and post-design services.

For all Local Government projects, the Consultant shall be responsible for providing the engineering services that complies with the Local Government Project Manual Sections 200 through 500 found on the Local Government Section's website: [http://www.azdot.gov/highways/localgov/Projects\\_Manual.asp](http://www.azdot.gov/highways/localgov/Projects_Manual.asp)

## **402 Partnering Process**

The Consultant and subconsultants shall participate in a Partnering Process consisting of the following items:

- Scope Clarification Meeting.
- Design Partnering Kick-Off Workshop.
- Participation in the Partnering Evaluation Program (PEP).
- Construction Partnering Workshop.
- Project Close-Out.

#### **405 AASHTO Design Criteria Report**

Any changes to the design criteria which result in the need for a design exception shall be submitted to the Roadway Design Group for approval. The request shall describe the deficiencies not previously approved which are not being corrected, and the justification for the design exception. The report shall be developed consistent with the Design Exception and Design Variance Process Guide that can be found in the Roadway Design Section website under Design Tools / Design Memorandums (dated 9/30/2008). ADOT will forward the design exception request to FHWA, if necessary. The Consultant is responsible for providing copies for ADOT and FHWA. The request shall be submitted a minimum of fifteen (15) calendars days prior to the Stage II design submittal, in accordance with Section 1060.

#### **410 Surveys**

The Consultant shall review data provided by ADOT. Any field surveys required shall be suitable for contract documents preparation and meet the technical requirements of ADOT and the State Board of Technical Registration. The Consultant is responsible, but not limited to, for the following:

- A. All surveys and mapping for projects utilizing existing roadway(s) shall be referenced and tied directly to the existing As Built roadway centerline. The centerline shall be re-established in its original position by locating, marking, staking and referencing the PC, PT, TS, SC, CS, ST, PI (if possible), and a minimum of fifty (50) feet station intervals along the curves and one hundred (100) feet station intervals on tangents. The use of offset baselines for re-establishing or defining the existing centerline is not permitted unless approved in advance by ADOT. The centerline stationing of the project shall be on ADOT's established field stationing.
- B. Completed surveys shall be submitted in permanently bound books (3-ring binders are not acceptable) with the final plans. The surveys shall include locations, stakes and references of control points, (including the beginning and ending points of the project), PC's, PT's, TS's, SC's, CS's, ST's, and PI's (if possible) of curves, POT's with a maximum interval of one thousand (1,000) feet, and bench marks on alternate sides of the roadway with a maximum interval of five hundred (500) feet. Any survey data provided must be certified by an Arizona Registered Land Surveyor. Any coordinates used shall comply with the Arizona State Plane Coordinate System.

C. Surveys may include, as applicable:

1. Base line control.
2. Control for aerial mapping.
3. Right-of-Way surveys.
  - a) Section corner and land ties.
  - b) Existing Right of Way monumentation.
  - c) Staking of new Right of Way for appraisal purposes.
  - d) New Right of Way monumentation.
  - e) A "Results of Survey" map.
4. Topographic surveys.
5. Roadway drainage surveys.
6. Utility locating - set control points with coordinates and elevations at five hundred (500) ft. maximum intervals adjacent to the road and along the utility lines (See Section 430).
7. Centerline staking, centerline of each roadway, as applicable for field review (lath stakes at PC, TS, SC, CS, ST, PT, and PI (if possible) at approximate two hundred (200) ft. intervals, and at selected locations if required to define the approximate limits of construction).
8. Centerline and edge elevations of existing pavement at fifty (50) ft. intervals.
9. Ties to Arizona State Plane Coordinates.
10. Final alignment staking.
11. Crossroads tie-ins, turnouts, and driveways.
12. Above ground utilities.

D. The Consultant shall obtain any permits that may be required prior to beginning field work. A traffic control plan may also be required. Preparation of surveys shall conform to applicable documents referenced in Section 200, including (but not necessarily limited to) procedures, record-keeping requirements, equipment use, and safety precautions.

- E. Unless otherwise directed by the ADOT project manager, the Consultant shall be responsible for selecting a scale that results in good plan clarity. The following scales are suggested:
1. 1" = 500' (Drainage map and R/W key sheet).
  2. 1" = 50' (Construction Plans and R/W maps).
  3. 1" = 30' (Landscape and Irrigation Plans).
  4. 1" = 20' (Intersections, urban streets, and other items of considerable detail).
- F. The Consultant may be responsible for setting R/W markers. R/W markers shall be set by an Arizona Registered Land Surveyor after acquisition of R/W, or, in some instances, after construction. All R/W drawings and legal instruments shall be approved and sealed by an Arizona Registered Land Surveyor.
- G. The Consultant may be responsible for delineating the R/W so that utility companies may prepare relocation plans. Delineation with strips of plastic flagging attached to lath located at intervals shall provide a clear delineation of the R/W; this work shall be completed immediately prior to the date that utility company personnel are scheduled to conduct a field survey of the project.
- H. Completed surveys and maps shall be recorded in an acceptable format. Upon final approval, the books, maps and CADD files (See section 490), shall be submitted to the ADOT project manager.

#### **411 Photogrammetry and Mapping**

The ADOT Photogrammetry and Mapping (ADOT P&M) Section works directly with Field Surveys to establish control for photogrammetric mapping projects. The Consultant is responsible, but not limited to, for the following:

- A. Mapping projects will adhere to the *ADOT CADD Standards Manual* and the current edition of the *ADOT General Specifications for Photogrammetric Mapping*. Copies of these documents can be obtained through Engineering Records at ADOT headquarters in Phoenix. It is the Consultant's responsibility to review and become knowledgeable with their contents. Miscellaneous reports and studies done by ADOT or ADOT consultants for particular projects may also be available. ADOT P&M will provide any documents necessary for project completion. Any necessary supplementation should be provided by the appropriate AASHTO and/or FHWA references. The ADOT P&M Coordinator/Advisor will provide guidance and direction.



- B. To facilitate project management, the Consultant will submit pertinent project metadata to the ADOT P&M in addition to current ADOT archiving methods. The metadata should include as a minimum:
1. Complete Tracs No.
  2. Route Number and/or Name.
  3. Project Description.
  4. Beginning and Ending Mile Posts.
  5. Project Datum.
  6. Ground Adjustment Factor (GAF).
  7. Arizona State Plane Coordinate System Zone.
  8. Aerotriangulation files.
  9. Aerial Photography Date and Scale.
  10. Contour Interval.
- C. The Consultant shall be responsible for the accuracy and completeness of the mapping project. Map contents include but are not limited to:
1. Digital Terrain Model (DTM) features (i.e. breaklines and mass points).
  2. Roadway features (e.g. edge of pavement, centerline, etc.).
  3. Horizontal and vertical control points.
  4. Planimetric features (e.g. buildings, signs, utilities, bridges, canals, fence lines, etc.).
  5. Contours and contour labels.
  6. Relief features.
  7. Spot elevations.
  8. Drainage features.
  9. Grid ticks.
  10. Match lines.

Unless otherwise directed by the ADOT Project Manager, photogrammetric mapping will be completed at either 1"=50' or 1"=100'.

- D. Map accuracy will conform to the standards set forth by the American Society of Photogrammetry and Remote Sensing (ASPRS). The standards can be found in the current edition of the *ADOT General Specifications for Photogrammetric Mapping* and the *ASPRS Manual of Photogrammetry*.
- E. To ensure mapping standards are met, the Consultant will have a Quality Control (QC) plan in effect. The plan will review ground control accuracy, flight alignments, photographic quality, aerotriangulation results, stereo compilation, map accuracy, and map completeness. The ADOT P&M Coordinator/Advisor may perform Quality Assurance (QA) checks on the final deliverables using a variety of inspections and testing. Final deliverables will have a neat appearance, be well organized, accurate, complete, and technically correct. Additional testing will be made if there is reason to suspect the map quality in general or at any specific location. See section 490 for added CADD requirements.

**ADOT PROJECT MANAGER:**

All photogrammetry mapping projects shall be submitted to the Engineering Survey Section through the ADOT and/or Consultant Project Manager, for archiving purposes. A notification of findings shall be sent to the Project Manager after completion of project review.

**415 Materials Design  
(Intentionally Left Blank)****416 Geotechnical Design**

Geotechnical requirements contained in the Materials Preliminary Engineering and Design (MPE & D) and AASHTO Manuals (See Section 200), shall be considered as minimum requirements for Subsurface Investigations. These requirements are not intended to preclude innovative methods of Geotechnical investigations and testing the Consultant may propose. Laboratories selected by the Consultant to perform construction materials testing and analyses must meet the requirements of ADOT's "System for the Evaluation of Testing Laboratories." The Geotechnical Design process will include appropriate reports, as required, for roadway and/or structure foundation designs.

Prior to submitting a proposal for geotechnical services, the ADOT Project Manager will schedule a meeting with the prime designer, the geotechnical consultant and the ADOT Geotechnical Design Section project team member. Project geotechnical issues will be discussed at this meeting and a consensus geotechnical work plan will be developed. Any subsequent changes due to access limitations, environmental restrictions, etc., will be reviewed and approved by the ADOT Geotechnical Design Section team member prior to the changed work being performed.

The Consultant Geotechnical Engineer is responsible, but not limited to, for the following:

- A. The Consultant shall perform a Geotechnical investigation of the project in accordance with the requirements of the ADOT MPE & D and Materials Testing Manuals. (Reference Section 200).
- B. The Consultant shall secure an access permit and all necessary clearances from the appropriate agency, if required, which may at a minimum require the preparation of an equipment access plan, description of equipment types, a plan of the test hole locations, etc. The Consultant shall adhere to all traffic control requirements when taking samples on existing roadways. A traffic control plan may be required.
- C. Geotechnical investigations shall include all necessary sampling, laboratory testing, and analyses of materials. Any core samples obtained shall be photographed and stored by the prime or sub-consultant until construction is complete or until the ADOT Geotechnical Design Section project team member and the ADOT Project Manager concur that there is no longer a need to do so.

Upon completion of the Geotechnical investigations, the Consultant may proceed with the preparation of the pavement and/or foundation designs, and the Materials Design and/or Geotechnical Design Reports.

- D. The Consultant's Geotechnical Design Reports shall include, but not be limited to the following as appropriate:
1. Results of the Geotechnical investigations inclusive of layout plans, borehole and/or test pit logs and test results.
  2. Roadway structural section requirements and the availability of structural section materials.
  3. Location and depths of topsoil.
  4. Soil shrinkage/swell characteristics.
  5. Slope stability in embankment/excavation locations.
  6. pH and resistivity conditions requiring design considerations.
  7. Design values for active, at rest, and passive soil pressures.
  8. Design loads or pressures, and estimated settlements for each foundation type.
  9. Design methods for shallow and deep foundations.
  10. Potential imported borrow site(s) meeting the requirements for the material(s) required (see also Section 417).
  11. Design alternatives based on Geotechnical findings.
- E. The Consultant shall include in the Special Provisions all notes related to materials found on the final construction plans and not already covered by the Specifications.
- F. The Geotechnical Consulting Engineer shall submit the following CADD requisites to ADOT Materials Group:
1. One (1) Electronic Copy of the final Geotechnical Design Foundation Data sheets submitted on CD-ROM.
  2. One (1) half-size (11"x17") print of the sealed and signed final Geotechnical Design Foundation Data sheets.

## **417 Earthwork**

The Consultant shall attempt to achieve an approximate earthwork balance for the project consistent with good engineering practice based upon the type of material and with consideration given to environmental mitigation measures unless otherwise directed; this may be accomplished by: a) refining roadway geometry (alignment and/or profile) utilizing ADOT Standard Drawings C-02 for slopes; b) adjustment of ditch widths and/or back slope rates to obtain excavation of additional suitable material; c) flattening of embankment slopes or creation of 'false cuts' to dispose of excess material; or combinations of a), b) and c). Adjustments shall not adversely affect water quality and must be coordinated with the project team, including the USFS coordinator, if applicable. Cost of additional right-of-way and environmental concerns must be weighed in determining the most feasible solution for the project.

When a project requires borrow or waste sites, the Consultant shall investigate and recommend the site requirements as outlined under paragraphs A, B, C and/or D below:

A. Current ADOT Materials Sources

The investigation shall begin with a review of current material source information available in the ADOT Material Section. "Current" in this context means that ADOT has or is expected to have licenses for any recommended material sources that will not expire until after the estimated construction completion date. Note that ADOT is not necessarily licensed for wasting at all current material sources. The results of the investigation shall be included in the applicable Consultant's Geotechnical Design Report (see Section 416).

B. Commercial Materials Sources

Commercial materials sources are an acceptable alternative to ADOT licensed material sources. If recommended, the analysis and test results of the material available at the commercial source shall be included in the Consultant's Geotechnical Design Report (see Section 416).

C. New Materials Sources

The licensing of new material sources for ADOT use is a lengthy process and should be considered only in the absence of acceptable current ADOT or commercial material sources. If the location, testing and environmental analysis of any new materials source is required to complete the design of the project, this work will be added to the contract by contract modification. The analysis and test results shall be contained in a separate report submitted by the Consultant not later than the Stage III submittal.

D. Waste Sites

If it is determined that a designated waste disposal site is required, the Consultant shall investigate and recommend the nearest site where material can be wasted. (See Section 450)

#### **418 Special Materials**

In the case where a special material(s), i.e. a material with characteristics and design values out of the normal range, is required to meet exacting design requirements, the Consultant shall coordinate with the ADOT Project Manager, Materials Section, and/or the Engineering District before changing the design or researching the location of such material(s).

#### **419 Pavement Design**

The ADOT Materials Group, Pavement Design Section require the following requisites on projects that require the design of a pavement section:

- A. The Consultant shall prepare a pavement design in accordance with the requirements of the ADOT MPE & D Manual.
- B. New pavement design shall conform to the approved AASHTO method. Structural overlay design shall conform to the Structural Overlay Design for Arizona (SODA) method.
- C. The Consultant's proposed pavement design recommendation shall be included in the Pavement Design Summary as described in the ADOT MPE & D Manual, section 505.00. The "Materials Group, Materials Design Report Standard Items" shall be used in the preparation of the Materials Design Report.
- D. The Material Design Report shall contain the Consultant's final recommendations for the proposed pavement design, including recommendations for special provisions and construction procedures, as described in the ADOT MPE & D Manual section 505.00, including the use of the "Material Group, Materials Design Report Standard Items".

#### **420 Environmental Studies**

Activities that require soil and/or vegetation disturbance such as Geotechnical investigations, surveys, etc. may not begin until the appropriate environmental clearance (i.e., cultural resources, hazardous materials, or biological evaluations) is issued. The project's environmental footprint shall consider all utility relocation work required for the project. ADOT Office of Environmental Services (OES), in coordination with the affected federal, state and local agencies and jurisdictions, will issue the required clearance.

The list below depicts typical activities that an environmental study shall include, as needed. The consultant shall obtain further clarification from either the Environmental Planning Group or the Natural Resources Group as reflected below:

**Environmental Planning Group**

1. Task Management.
2. Natural Environment.
3. Floodplains.
4. Section 404: Jurisdictional Delineation.
5. Section 404 and 401: Permit.
6. Section 4(f) analysis (Federal \$\$ only).
7. Land Use.
8. Visual Impacts.
9. Prime or Unique Farmland.
10. Wild & Scenic Rivers.
11. Sole Source Aquifer (Fed: Tucson/Bisbee).
12. Noise.
13. Air Quality.
14. Construction-Related Impacts.
15. Utility Impacts.
16. Hazardous Material Evaluation.
17. NPDES.
18. Socioeconomic.
19. Cultural (If survey, testing or data recovery are needed, submit a separate scope and budget).
20. Public/Agency Scoping.
21. General Actions.

**Natural Resources Group**

1. Logging.
2. Materials.
3. Herbicide Application.

4. Vegetation Clearing and Shipping.
5. Environmental Assessment (EA).
6. Environmental Overview (EO).
7. Supplies and Materials (i.e. herbicides, equipment, etc.).
8. Seeding.

## **425 Public Information Meetings and Public Hearings**

The Consultant shall provide staff and/or materials for public information meetings as outlined below if they are found to be necessary. ADOT will be responsible for advertisement and will make arrangements for the public information meeting(s). ADOT will provide a moderator and any liability insurance required.

### **A. Public Information Meetings**

The Consultant and staff shall be available, at five (5) workdays of notice, to attend meetings or make presentation at the request of ADOT. The purpose of these meetings shall be to inform the public of, and answer questions regarding, the scope, details, and anticipated schedule of the project. Such meetings and presentations may be held at any hours between 8:00 AM and 12:00 midnight on any day of the week, except legal holidays. The Consultant will be responsible, as applicable, for the preparation of graphics, hand-out materials, notes of the meetings, audiovisual displays and similar material for such meetings. All such materials shall prominently identify ADOT. The Consultant shall expect to work with the team to finalize the agenda for any public meetings.

### **B. Public Information News Releases**

The Consultant and staff shall be available, with one workday of notice, to support the ADOT preparation of newspaper articles, newsletters, flyers, radio and TV announcements, etc. and to assist ADOT with responses to verbal and written questions from the media and the general public. The purpose of these news releases shall be to provide the media and public with the latest information on the scope, details and schedule of the project.

## **430 Utilities and Railroads**

All work shall be performed in accordance with ADOT's *Guide for Accommodating Utilities on Highway Right-of-Way*, the *Utility Coordination Guide for Design Consultants* and the *Stage Submittal Check List*.

The consultant shall utilize, and modify if necessary after discussion with U&RR, the letter formats provided in the *"Utility Coordination Guide for Design Consultants"* when

communicating with the utilities. Copies of all correspondences and responses shall be copied to U & RR.

#### A. Definitions

- a) Utility - A facility which transmits or distributes communication, cable television, electricity, heat, gas, oil, crude products, water, sewer, waste or any other similar commodity which directly or indirectly serves the public.
- b) Utility Company - A municipality, public service corporation, utility district, etc., which owns and operates utilities that serve the general public. Unless otherwise noted, the procedures to be used with railroad companies will be the same as those used with utility companies.
- c) Prior Rights documentation - Documents showing that the utility company's facility predates the acquisition of the property for highway purposes, or that it occupies an easement or other compensable land right. Such documents provide verification that the State is obligated to compensate the utility company for the cost of relocations or adjustments required to accommodate the highway project.
- d) U & RR - Utility and Railroad Engineering Section of the Arizona Department of Transportation.

#### B. Previous Information

The Consultant shall use all available utility location information including that obtained during the DCR phase; this information, and additional information gathered later, shall be shown on the plans prior to submittal to the utility companies for review.

#### C. Identification of Utilities

1. By Design Consultant – The Design Consultant shall contact, and coordinate with, all of the utility companies within and/or serving the project area to obtain utility facility location records and as-built information.

Dependent upon the needs of the project, U&RR may reduce the required research efforts.

2. By Locating Consultant – Designating and Locating (Potholing) is not required on all projects and is based on the needs of individual projects. The need for this service is to be discussed with U&RR. When needed, the Design Consultant shall prepare and furnish a base map with ground controls at intervals of no more than five hundred (500) feet together with a description of the desired area, along with other documents and communication as U&RR may request, for horizontal utility designation. Documents provided will be



used by the locating consultant for identification and horizontally locating all utilities. This will be accomplished prior to the completion of Stage II plans. The map shall be presented on CDs using current ADOT CADD standards. The Design Consultant shall provide a list of requested potholes to U & RR, for use by the Locating Consultant, for utilities that may conflict with the project. This pothole data will be obtained prior to completion of the Stage III plans.

3. Railroad information – If railroads are present in the project, the design Consultant shall request U & RR to make the initial contact with the railroad company to obtain railroad information prior to the design kickoff meeting.

#### D. Right Of Way

The Consultant shall assist in the development of exhibits for transfer of right of way if requested by ADOT Right of Way.

The Consultant shall assist in the development of exhibits for transfer of right of way to utilities with prior rights.

### **431 Utility Conflicts and Adjustments**

- a. The Consultant shall determine all utility conflicts which require the utility to be relocated or adjusted and shall advise U & RR and the utility company.
- b. The Consultant shall advise U & RR of upgrades or betterments requested by utility companies.
- c. When property is acquired for a highway project, private utility issues are resolved as part of the right of way acquisition. The Consultant shall coordinate these and any private utility issues with the ADOT Right of Way Coordinator and Project Manager.
- d. The Consultant shall arrange and conduct utility coordination meetings to facilitate identification and resolution of conflicts based on project needs as requested by the ADOT Project Manager and U & RR.
- e. The Consultant shall be responsible for reviewing relocation plans produced by utility companies to ensure that all anticipated utility conflicts with project plans and with planned utility relocations are mitigated. The consultant shall also ensure that proposed utility installations conform to ADOT's *Guide for Accommodating Utilities on Highway Right-of-Way* and that the plans meet ADOT permit requirements.
- f. The Consultant shall solicit submittal of, and verify that prior rights documentation submitted by utility companies represent the areas of the project where utility relocations will be required, and shall submit this reviewed documentation to the U & RR coordinator. The request for prior rights shall take place after the Stage II submittal. Complete prior rights documentation shall be submitted to U & RR no later

than the Stage III submittal.

Prior Rights documentation should only be requested for portions of the project where utility conflicts are expected. The consultant shall avoid discussing opinions of prior rights validity with the utility until U & RR has completed its review of prior rights status.

- g. Only U & RR will authorize utility companies to start design and/or construction. This will apply to prior rights and non-prior rights situations. Authorizations shall be given in writing. If a verbal authorization is given it shall be followed up with a written one. In all cases, the authorizations shall be dated and signed with copies sent to the appropriate individuals. The utility will be requested to provide relocation plans and scheduling for review by U&RR.
- h. The Consultant shall prepare draft Utility Special Provisions and submit them to U & RR for comment. This includes Section 107.15, Force Accounts and Line Item Specifications. Special Provisions shall be drafted starting at Stage III and progress with the project to the PS&E Stage.
- i. With each stage submittal listed below, the Consultant shall submit a Utility Report. The Report shall document and update the utility coordination process at each stage. The coordination process shall be conducted in accordance with the appropriate responsibility chart matrix established in the *"Utility Coordination Guide for Design Consultants"*, and other documents such as the *"Stage Submittal Check List"*.
  - i. Within the first thirty (30) days after Notice to Proceed (NTP) the Consultant shall prepare a Utility Report for submittal to U&RR containing:
    - A list of all utility companies in the project area.
    - Each utility company contact person.
  - ii. At Stage II the Utility Report shall contain an update of the listing provided in item 1 above as well as:
    - An initial utility cost evaluation to relocate utilities in conflict.
    - All right of way necessary for utility relocations shall also be identified.
  - iii. At Stage III the Utility Report shall contain all of the above as well as:
    - Any changes to what was previously presented.
    - A list of who is responsible for payment of relocation work.
    - A list of the mitigation measures by utility, a summary of the meetings held with each utility company - what was discussed and when, and what actions were taken to arrive at the selected mitigation measure.
    - A list of pothole data requested and provided.
    - A copy of all correspondence between the Consultant and each utility company.

- A preliminary estimate of ADOT's cost for utility relocations, and betterment requests by a utility company, for work to be included into the ADOT project.
  - Final mitigation measures shall be approved by the U & RR.
4. At Stage IV the Utility Report shall contain all of the above as well as:
- Any changes to what was previously presented.
  - A notification of approval of utility company relocation plans as to conformance with the project design and standard ADOT procedures and practices.
  - A construction schedule for each utility.
  - A final cost estimate for each utility with approved prior rights, or betterments.

All of the above shall be included with the project design and the final utility clearance letter package.

- J. The Consultant is to work closely with the utility company and the U & RR coordinator to determine the relocation requirements of the utility facility. The Consultant shall inform ADOT Right of Way on or before the Stage II submittal if new right of way is required which exceeds what is needed for the highway improvements.
- K. ADOT's Roadside Development Section (landscape and irrigation), Transportation Planning Division (Traffic Counter Systems) and Transportation Technology Group (FMS) are to be consulted about their needs during the project development process. Other appropriate ADOT sections are to be contacted for facilities present at pump stations, inspection stations, rest areas, etc. New electric service drops and water connections for any of these shall be included in the scope of the project. See Section 435 "Establishing Utility Service Connections".

## **432 Utility Plans**

- a. The Consultant shall indicate all existing utilities in plan view on the Stage II plans; this may include utility poles and lines, pedestals and other above-ground appurtenances, all underground utilities, and drainage facilities. The consultant shall provide a legend key for any symbols used to depict utilities.
- C. The Consultant shall indicate potential areas of conflict between utility facilities and project improvements. The Consultant shall work with the utility companies to mitigate conflicts. Project plans are to be adjusted as much as possible to avoid utility conflicts without impacting the needs of the project or public safety. Pothole data will be made available to utility companies no later than Stage III plans.
- D. The Consultant shall furnish copies of the Stage II, III, IV and PS&E project plans to U & RR and each utility which has facilities in the area. The Consultant shall furnish

copies of cross sections to U & RR and, upon request, to the utility company. Cross section plans will be required when existing utility facilities have been installed parallel to the roadway centerline within ADOT's right of way. Cross section plans shall show the location and depth of utilities running parallel to the roadway centerline. The size of the plans, 1/2 size or full size, shall be as requested by the utilities. In all cases, plans shall be full size or true half-size and shall relate to standard drafting scales. The Consultant shall send plans to the utility companies, receive the comments and responses, and provide U & RR copies of all correspondence to and from the utility companies. Utility comments and their resolutions shall be included on the appropriate Stage Comment Resolution Form and distributed to all team members, and utility companies, within ten working days after the comment resolution meeting. Any plans or right of way changes which may affect existing utilities, or their relocation, are to be specifically brought to the attention of the utility. This shall include any slope adjustments, curb locations, cut/fill changes, etc.

- E. The Consultant shall include utility relocation plans no later than the Stage IV submittal.

### **433 Utility Relocations and Adjustments**

Where a utility relocation may be required:

- A. The Consultant shall identify possible alternatives (including joint use of trenches) to minimize the number of utility conflicts and minimize the cost of mitigating conflicts.
- B. The Consultant shall notify U & RR promptly upon determination that relocation of a utility company facility is required. Where the utility relocation is to be included as part of the project, and where the ADOT contractor will perform the work, the Consultant shall provide U & RR with design cost details, drawings and a summary of the construction costs for the work to be billed. The Consultant shall use input and drawings supplied by the utility company to the extent possible.
- C. U & RR will determine, by examination of prior rights documentation provided by the utility company, the utility's rights to occupy the area of conflict and who is responsible for the cost of the relocation. U & RR will notify the utility company to relocate at its own expense, or will obtain the necessary cost estimates and prepare the necessary utility agreements to allow for payment of utility relocation work when it is at ADOT expense.
- D. At the request of the utility and/or the U & RR coordinator, utility adjustments or installations may be included in the plans and specifications for work to be performed by ADOT's contractor. This may require a JPA, prepared by the project manager, or a utility agreement, prepared by U&RR. The decision to include this work shall be

determined no later than the Stage III submittal date. Initial cost estimates shall be provided with the Stage III submittal to assist programming and budgeting efforts.

- i. Utilities with prior rights--ADOT is responsible for cost incurred. Additions, betterments, and utilities without prior rights--utility company is responsible for cost.
  - ii. Consultant shall advise U & RR of utility company's request, and shall advise the utility company that approval of its request is subject to concurrence by ADOT.
  - iii. Consultant shall provide an estimate of the cost, or review and comment on cost estimates provided by the utility company.
  - iv. Consultant shall coordinate with utility company to ensure that adequate information is included in the bid package.
5. The Consultant, with input from utility, shall provide U & RR and the Project Manager the actual cost of design and expenses for utility relocation, adjustments, or betterments for inclusion in the JPA or Utility Agreement.

#### **434 Utility Special Provisions and Clearance Letter**

##### **A. Special Provisions**

The Consultant shall prepare Special Provisions and submit them to U & RR for comment at Stage III, IV and at PS&E.

The Utility Special Provisions shall include the following:

1. List of utility companies in the area, and contact person's name and telephone number.
2. A statement that there are no utility conflicts and/or a list of utilities that are in conflict.
3. Work to be performed by utility companies in conjunction with the contractor during project construction.
4. Completion date or schedule for each utility conflict as provided by each utility company.
5. Work to be performed for each utility company by the Contractor and any communication requirements between the utility and the contractor.

6. Utility license, permit, insurance, or right of entry requirements.
7. Indicate special conditions, locations or clarifications related to utility facilities or work that might affect a contractor's bid or schedule.

#### B. Clearance Letter

The Consultant shall prepare a Utility Clearance Letter prior to Stage IV and submit it at Stage IV, together with copies of correspondence from utility companies verifying the information, to U & RR for review and concurrence; this shall include the Consultant's final review and submittal of Section 107.15 or other Special Provisions related to utility work.

If there are no conflicts:

1. A statement that there are no utility conflicts with the project shall be used only when there are no utility facilities needing adjustment or when all adjustments have been completed prior to writing the Clearance Letter. A list of utilities is to be provided as noted in the special provisions stated in section 434 A.
2. If adjustments are needed the Clearance Letter shall list each utility company separately, showing:
  - a. The name of the company, address, contact name and phone number.
  - b. The nature of required adjustment.
  - c. The status of Agreements and applicable permits. (City, County, Forest, State Land, etc.).
  - d. The status of the utility adjustment.
    - Completed.
    - To be done by contractor during construction.
    - To be done by utility company during construction, with estimated completion date or number of working days required following milestone achievement.
    - In progress, with estimated completion date.

### 435 Establishing Utility Service Connection

The Consultant is responsible for securing establishment of service connections prior to construction. The following are steps for securing utility service:

1. Utility service connections are required to facilitate operation of lighting, signals, FMS systems, irrigation controllers, pump stations, rest areas and inspection stations, etc.

The Consultant is responsible for determining service connections, which will include the design, schedule, procedure and payment arrangements prior to construction. The service agreement provided by the servicing utility, utilizing design information from the project designer, will be reviewed, approved and signed by the user of the services (ADOT traffic signals, maintenance, etc.).

2. Consultant shall prepare a service request letter on ADOT letterhead for signature of the PM or ADOT Traffic Group representative. The request letter will contain the project name, project number and Tracs number to which it applies, as well as the following, dependent upon type of service:
  - a. Number of electrical (or other) services required.
  - b. The address of each service.
  - c. The required voltage/volume/pressure of each service.
  - d. The load breakdown for each service.
  - e. A brief description of the work required.
  - f. Who is responsible for signing the utility's service agreement and who will pay connection/extension charges. Signing of service agreements is not the responsibility of the U&RR.
  - g. Who is responsible for paying the utility bills and to whom and where to send the monthly billings. Periodic Service costs are not the responsibility of U&RR and are to be directed to the Traffic Group or the respective maintenance district.
3. The Consultant shall include the name and phone number of the utility contact person responsible for arranging the new service in the Special Provisions with instruction to the Resident Engineer to contact the utility for scheduling the work when service is desired.
4. Consultant shall place the service address on the plans adjacent to the appropriate load center and/or meter.
5. Consultant shall show the location of the utility service source so the contractor will know where to excavate to/from.

## 440 Roadway Design

The Consultant shall prepare design plans on ADOT standard sheets and construction documents for the roadway improvements including but not limited to the following:

- A. Face sheet and List of Standard Drawings (ADOT will provide these sheets for incorporation into the design plans).
- B. General notes.
- C. Design sheet and index.
- D. Typical roadway and detour sections.
- E. Roadway and detour plans and profiles.
- F. Intersection plans and profiles, including staking plans.
- G. Cross road and frontage road plans and profiles.
- H. Retaining wall and sound barrier wall plans and profiles.
- I. Earthwork quantities.
- J. Details.
- K. Special provisions.
- L. Annotated cross sections.
- M. Arizona State Plane Coordinate Ties.

**NOTES:**

Standard plan sheet size is 22" x 34" (ANSI "D" Size) with borders as specified by ADOT. All plan sheets shall be suitable for plotting at true half scale.

Cross sections will not be part of the plans, but will be reviewed and made available to contractor's bidding on the project. Therefore, the cross sections must be suitable for reproduction. Horizontal and vertical scales shall be the same. Preferred scale: 1"=10', (1"=5' or 1"=20' are also acceptable if special conditions warrant). Each cross section shall show the plotted finished grade roadway template(s) including the subgrade superimposed on the plotted natural terrain (dashed line) and shall include as a minimum the following annotation: centerline finished grade elevation and station value of controlling roadway template on each cross section, R/W limits indicated with symbol. Slope rates (X:1) should be shown on the cross sections, on each side of the controlling roadway, on the last slope that connects to the existing ground. Connecting slopes from adjoining roadways, such as median slopes, should have both connecting slopes annotated, if applicable. The slope rate information may be provided separately in a station by station listing as an alternative. Construction phasing, temporary roadways and detours shall be shown on cross sections, if applicable. CADD computer generated cross sections shall be plotted with a 1" grid and shall have an appropriate horizontal and vertical tick marks (10 tick marks per inch) with 1" datum annotations (elevation on vertical and distance on horizontal) and



shall be plotted on vellum paper suitable for reproduction. The final submittal shall be on standard 22"x 34" sheets submitted with a copy of the work on CD as stated in section 1040. Cross sections shall normally be prepared at one hundred (100) foot intervals, as a minimum, with additional sections at breaks in the terrain unless otherwise directed by the ADOT project manager. Cross sections shall be included in all submittals to utility companies and as requested by other members of the team.

All designs shall conform to the latest Americans with Disabilities Act Accessibility Guidelines Title I and II.

The Consultant shall provide the various ADOT Technical Sections involved in the design of this project with roadway base sheets as required.

#### **445 Roadway Drainage (Intentionally Left Blank)**

#### **446 Roadway Drainage Reports**

- A. The Consultant shall be responsible for preparing the Initial and Final Drainage Reports for drainage.
- B. The Consultant shall conduct hydrologic and hydraulic analysis and/or obtain available public information to identify flood plains and probable flood plain impacts. The Consultant shall determine existing and developed conditions, discharges for all pertinent drainage systems, and existing flow patterns; assess possible drainage problems, identify possible solutions, and propose tentative hydraulic improvements.

Part A of the Initial Drainage Report, hydrologic information, may be submitted and informally discussed with the ADOT Drainage Section prior to detailed hydraulic analysis in order to facilitate proper progress of the study. The Drainage Report may require additional data as it relates to NPDES, i.e., flow analysis in ditches, intersecting drainage's, etc., in order to adequately design temporary erosion control structures.

Following Part A, Hydrologic Information Review, the Consultant shall conduct hydraulic analyses of proposed flood plain modifications, hydraulic structures, and drainage-related improvements which are proposed. The Consultant will then prepare an Initial Drainage Report consisting of both Part A, Hydrologic, and Part B, Hydraulic, studies and their supporting documentation.

- C. The Consultant shall prepare a Final Drainage Report, pursuant to comments and approval of the Initial Drainage Report, based on refined hydraulic structure selections and sizing. The report shall provide analysis of changes to existing flow patterns and the design of channels, culverts and other drainage structures.

- D. The Consultant shall submit to ADOT Roadway Drainage Section one electronic copy containing all final drainage reports of the project in digital format (PDF) on a CD-ROM or DVD and one hard copy of the final sealed and signed reports. The reports will include not only the analytical data and computations, but the entire report, including but not limited to texts and graphics.
- E. The Final Drainage Report shall be submitted concurrent with the Stage III Design submittal unless other arrangements are made with the ADOT Project Manager.

#### **447 Roadway Drainage Designs**

The Consultant shall prepare designs and construction documents for drainage features including, but not limited to:

- A. Drainage culverts and underpass structures for cattle/game crossings.
- B. Catch basins, manholes and connector pipes.
- C. Drainage Pipe and Concrete Box Culvert Summary Sheets.
- D. Drainage details.
- E. Drainage culvert profiles.
- F. Retention/Detention Basins.

#### **448 Section 404 Permit**

ADOT with the Consultant, as appropriate, in consultation with the Corps of Engineers, will determine the need for a Section 404 permit. If a permit is required, ADOT will process the permit application. The Consultant shall be responsible for providing ADOT with technical data for the roadway cross drainage-ways (i.e. typical sections, location and approximate areas of cut and fill within each drainage way) to support the determination of need for a permit and/or the permit application.

#### **449 Evaluation of Alternative Pipe Culvert Materials**

The Consultant shall be responsible for evaluating all forms of ADOT approved pipe culverts. Evaluation documentation shall be included with the design calculations per Section 1040. Valid designs shall be indicated on the New Pipe Summary Sheet.

#### **450 Landscape Architectural Practice and Design**

- A. The Landscape Architect shall be responsible for performance of professional services such as investigation, reconnaissance, research, planning, design or responsible supervision in connection with the development of land and incidental water areas where the dominant purpose of such services is the preservation, landscape ecological restoration, enhancement of proper land uses, natural land features ground cover and planting, naturalistic and aesthetic values, the settings and approaches to building, structures, facilities or other improvements, natural drainage and the consideration and the determination of inherent problems of the land relating to erosion wear and tear, light or other hazards.
- B. Landscape Architecture services to accomplish the above mentioned may result in the preparation of the following work products including: Reports for Site Analysis and Planning; Visual Analysis; Resource Planning Inventory and Evaluation; Research Information and Documentation; Design and Construction Documents, Specifications, Constructability Reviews, Post Design and Responsible Construction Supervision.
- C. Investigation, Reconnaissance Research, Planning, Design and Responsible Supervision Work may include but not be limited to: Aesthetic evaluations and Visual Quality and Impact Analysis to determine appropriate mitigations; Design of Structure and Wall Aesthetic Treatments; Landscaping and Irrigation Systems and when possible Sustainable Landscaping; Landform Grading and Graphics; Water Conservation Measures, Audits and Water Harvesting; Landscape Ecological planning involving Resource Conservation and Protection; Habitat Mitigation Restoration; Reclamation and Revegetation; Native Plant Inventory, Salvage, Replanting and Establishment; Noxious Weed Control; application of Best Management Practices (BMPs) for Erosion and Sediment Control, Water Quality Protection; Storm Water Pollution Prevention Plan (SWPPP) Index Sheet, Erosion and Sediment Control Plans; preparation of Design Construction Plans Documents, Specifications and Estimates.
- D. The Landscape Architect consultant shall be responsible for coordination of work with Roadside Development Section during all design phases. Work completed shall be in accordance with AASHTO, ADOT Design Manuals, Guidelines and Policies.
- E. The consultant shall complete and Seal Project Plans, Specifications and Estimates necessary for project design development for use by other team members and for bidding and construction. The consultant may be required to provide Responsible Construction Supervision or Construction Contract Administration.

## 455 Bridge Design

The Consultant shall prepare design and construction documents for structural design including, but not necessarily limited to:

- A. General plan.
- B. General notes and quantities.
- C. Foundation sheets.
- D. Abutment details.
- E. Pier details.
- F. Superstructure sheets.
- G. Screed elevations.
- H. Special details (if applicable).
- I. Stage construction sequencing details (if applicable).
- J. Pile records (if applicable).
- K. Special provisions and cost estimates.

#### **456 Bridge Selection Report**

During Stage II, prior to preparation of final design and construction documents, the Consultant shall submit a Bridge Selection Report for the new bridge and/or for renovation of the existing bridge. The report shall be prepared in accordance with the ADOT Bridge Design Guidelines. ADOT must approve the report prior to the Consultant beginning the final design of the bridge.

The final structural plans shall reflect the most current design standards, specifications and ADOT policy. Therefore, the Consultant shall be responsible for studying revisions to the plans made during the development of the project and ascertaining how the structural design will be affected. The Consultant shall work with the ADOT project manager, who will give the final authorization, in determining the propriety of modifying the design to accommodate the revised standards, specifications and ADOT policy. The Consultant will be compensated by Contract Modification for any significant redesign resulting from this requirement. A final review of the applicable standards and specifications will be conducted by the Consultant at Stage IV.

#### **457 Bridge Hydraulics Report**

For structures in the National Bridge Inventory (NBI) or structures proposed to be in the NBI, the Bridge Hydraulics Section under the Bridge Group will be responsible for the Bridge Hydraulics Report review. For the waterway structure, individual Bridge Hydraulics Report is required. For non-waterway structure, the deck design shall consider the effects of hydroplaning and deck drainage. For design details, the designer is required to refer and follow the Bridge Hydraulics Guidelines and Section 446 of this document.

#### **460 Traffic Engineering Design (Intentionally Left Blank)**

#### **461 Traffic Engineering Study**

The Consultant shall perform a Traffic Engineering Study which addresses those concerns that are appropriate for the project. The study shall provide all necessary data not already furnished by the Department. It is expected that the Consultant will make one or more visits to the project site to familiarize themselves with any issues that may have any bearing on the success of the project.

The Traffic Study should also address the items listed below. The items listed are intended only as a guide and are not meant to necessarily limit the scope of the study:

- A. Average Daily Traffic.
- B. Turning movements at each intersection.
- C. Accident Data and Analysis.
- D. Access Control.
- E. Signing.
- F. Pavement Markings.
- G. Pass/No Pass Zones.
- H. Speed Zones.
- I. Signal Warrants.
- J. Left and Right Turn Warrants.
- K. 30th Hour Design Hour Volume.
- L. Peak Hour Volume.
- M. Bicycle Activity.
- N. Pedestrian Activity (ADA Requirements).
- O. Parking.
- P. School Zones
- Q. Appurtenances (guardrail, barriers, etc.).
- R. Channelization, Turning Templates.
- S. Signal Phasing & Timing.
- T. Operations and Capacity.

**Note:** The need for these items will vary depending on the nature and locale of the work.

## 462 Traffic Control Plans

When required by the complexity of the project, the Consultant shall prepare an appropriate phasing plan for the project. The plan shall be consistent with good constructability, taking into account the contractor's probable approach to the work and the cost and inconvenience to local businesses and residents. Phasing and project duration should be coordinated through the Project Manager, the Construction District and Contract & Specifications Services.

Once the project phasing has been determined, the Consultant shall prepare a traffic control plan which may be as simple as a few paragraphs in the Special Provisions outlining which setups in Part VI of the MUTCD or the ADOT supplement are to be used or may be a set of detailed plans showing exact configurations of traffic control devices for the project. A summary of quantities and duration along with an estimate of costs and any special provisions shall be provided by the Consultant at each stage of the project beginning with Stage II.

New construction, reconstruction, pavement rehabilitation, overlays, bridge widening or repairs and other similar work generally will have a significant impact on traffic operations and will normally require a set of Traffic Control Plans with quantities, duration, unit prices, and special provisions.

The following categories of projects generally have a low impact on traffic operations and do not normally require traffic plans:

- A. Landscaping projects of short duration.
- B. Signal projects.
- C. Scour protection projects.
- D. Fencing projects.
- E. Sound wall projects.
- F. Signing projects (except overhead installations).
- G. Lighting and other electrical projects.
- H. Sidewalk and ADA ramp projects.
- I. Bike lane projects.
- J. Rest area construction projects.
- K. Minor surface treatments (Chip Seals).

Special Provision 701 DETRM can be used for projects that fall into the low impact categories. This special provision provides pre-determined unit prices for all of the likely pay items. There are, however, two lump sum items which must be computed. Item 7010001 is intended to provide a summary of the anticipated cost of the devices to be used on the project; this item shows in the bid schedule as a fixed price. The second lump sum item, 7010006, allows the contractor to recover his costs for furnishing, placing, and removing the various devices during the construction.

Two other pay items may be included in the bid schedule, when appropriate. Both items require the contractor to provide a bid amount. The items are 7010010, Temporary Concrete Barrier and 7010012, Temporary Impact Attenuation Devices.

Upon final design approval for any and all work that involves Traffic Engineering or Design, the Traffic Engineering Group requires that the following CADD related deliverables be submitted to the Design Project Manager as indicated in the General Specifications for adherence to ADOT's CADD Standards:

- a. All SignCad files shall be submitted in ADOT's current version of SignCad (.SGN).
- b. All design CADD files associated with Traffic Design, including Traffic Signals, Signing, Pavement Marking, Traffic Control, Pre-Design, HES Projects, and Permit Designs, shall be submitted in ADOT's current version of MicroStation 2D format (.DGN)(2D).

In addition, a copy of the Letter of Transmittal indicating all Traffic related deliverables have been submitted to ADOT shall be forwarded to the Traffic Engineering Project Manager for approval.

#### **463 Intersection Signalization and Roadway Lighting**

The designer shall prepare construction documents for installation of traffic signals. Installations for future signals may require only conduits and pullboxes.

The designer shall comply with ADOT's current lighting policy and provide a complete set of roadway lighting construction documents that are predecaded on needs study and design parameter report that includes, but not limited to:

- A. Complete freeway lighting including mainline, entrance and exit gore areas, ramps, and crossroads.
- B. Underdeck and Tunnel Lighting.
- C. Sign Lighting.

The designer shall in accordance with Section 430 and the project scope of work coordinate with the local electric utility to provide electric service. If warranted, the designer shall advise the project manager of the need for an IGA with the local jurisdiction for funding, maintenance, and energy costs.

#### **464 Signing Plans**

The Consultant shall prepare designs for signing that are consistent with current signing practice and in conformance with the Manual on Uniform Traffic Control Devices (MUTCD), the Traffic Engineering Design Manual, the Manual of Approved Signs (MOAS), PGPs, and Signing and Marking Standards, 2002. Freeway signing within the MAG system shall in addition conform to the MAG network Signing Plan, dated January 1992.

A sign summary shall be provided in the project plans. Non-standard signs shall be detailed on the project plans following the formats given in the above referenced documents. The signing summary, a detailed estimate of costs, and any special provisions shall be included with each submittal beginning with Stage II.

#### **465 Pavement Marking Plans**

The Consultant shall prepare permanent pavement marking designs for the roadways within the project limits to show center, edge and lane line striping, stop lines, crosswalks, arrows, legends, and symbols, raised or recessed pavement markers, object markers, delineation or other markings as may be consistent with the needs of the project and in conformance to the requirements of the MUTCD, the Traffic Design Manual, PGPs, and Signing and Marking Standards, 2002. The Consultant shall confer with the district representative and Traffic Group to determine which types of marking or delineation materials are appropriate for the project. The summary of quantities, a detailed estimate of costs, and any special provisions shall be included with each submittal beginning with Stage II.

#### **466 Intelligent Transportation Infrastructure**

The designer shall prepare construction documents for elements to be included in the project for accommodation of the Intelligent Transportation Infrastructure in accordance with the ADOT Freeway Management System Design Guidelines.

#### **470 Right-of-Way (Intentionally Left Blank)**

#### **471 Right-of-Way Requirements Determination**

The Consultant shall determine the requirements for new right-of-way (R/W) and easements, including, but not limited to, new roadway R/W, slope easements, drainage easements, temporary construction easements, waste site R/W, access control R/W, borrow source R/W and haul road R/W.

The Consultant shall submit to ADOT, in writing, the preliminary R/W requirements on or before the Stage II design submittal and the final R/W requirements on or before the Stage III design submittal. No revisions or additions to the R/W requirements will be allowed after the Stage III submittal without the approval of the ADOT Project Manager.



The new R/W requirements shall be submitted in triplicate to ADOT for review and shall include the following as a minimum:

- A. A letter indicating the project name, contract number, project location, originator of report (Firm's Name), submittal date and submittal type (Stage II or III).
- B. A plan of sufficient scale and detail to show the existing and proposed roadway R/W and proposed easements.
- C. Type of acquisition required:
  - At the Stage II submittal, the new requirements may be estimates of the final R/W with enough definition to identify all ownership's that will be affected. The preliminary requirements should be large enough to cover all possible R/W needs.
  - At the Stage III submittal, the new requirements shall be accurately defined with widths, lengths, stations, offsets, etc.

In addition, all R/W plans shall conform to current Right of Way Plans Standards and Manual. When all comments have been addressed, the designers of ADOT projects shall submit the following:

- a. Beginning and Ending Mileposts in tenths of a mile.
- b. Revised Calculation Book sheets and Point ID sheets, if necessary.
- c. An ASCII coordinate electronic file in the following format: Point Number, Northing, Easting and Description using commas as delimiters. Designers of ADOT projects shall ensure that this file is free of extraneous text such as page numbers, headers, batch commands, and the like. The file shall be such that it can be imported into a COGO program without reformatting by ADOT Right of Way Plans Section. Only numeric numbers shall be accepted.
- d. One (1) half-size print of the Final Right of Way Plans set.
- e. One (1) full-size set of sealed and signed Mylars trimmed to 22" x 34" .

## **472 Right-of-Way Acquisition**

If new R/W is required for the project, ADOT will acquire all necessary R/W and easements. Based on the requirements provided by the Consultant, ADOT will:

- a. Prepare final R/W plans and associated documents necessary for R/W acquisition (Final plans may be prepared by others).

- b. Acquire necessary R/W including easements, material sites and waste sites.
- c. Obtain the necessary authority to proceed with the various phases of property acquisition.
- d. Prepare the necessary data for Transportation Board resolutions and project clearance letters.

### **473 Temporary Entry Documents**

A temporary entry document for entry to each parcel for any or all of the following activities is required: Geotechnical investigations, and design or construction survey work. The Consultant shall notify ADOT of the need for any temporary entry documents no later than thirty (30) days after the notice to proceed. ADOT will obtain the appropriate owner's signature. The Consultant may not enter any such property prior to approval of the temporary entry documents by ADOT.

### **480 Cost Estimates**

The Consultant shall prepare combined and detailed estimates (cost estimates) in the format recommended by Contracts and Specifications Section. The cost estimate shall include a recapitulation sheet concurrent with each review submittal. Computer generated estimate forms may be used, provided the format is approved by the Contracts and Specifications Section. The Consultant shall prepare a bid schedule at the stage II review, and concurrently with each review submittal thereafter. ADOT will provide the necessary format.

The budgeted cost for the project is indicated in Section 140 of the Scope of Work. The Consultant shall immediately advise ADOT, in writing, if there is any reason to believe the project cannot be constructed within the allocated budget. The Consultant shall identify options to maintain the project within budget, including reducing the project scope, revising criteria, or changing the project phasing.

### **485 Specifications**

The Consultant shall be responsible for identifying critical elements of construction, including, but not limited to, construction limits, access requirements, potential night construction, coordination with affected local agencies (police, fire, USFS, etc.), traffic lanes open, scheduling of work time (bar chart format illustrating estimated construction time), utility trench close ups, incentives and liquidated damages, State-furnished materials, critical materials requiring pre-bid purchase, and limitations specifically addressed in the environmental, right-of-way, and utility clearances.

## **486 Special Provisions**

The Consultant shall prepare Special Provisions for items, details, and procedures not adequately covered by ADOT's Standard Specifications and Stored Specifications. Unusual requirements necessary for obtaining permits for hauling materials shall also be included. Special Provisions shall be submitted at the Stage III and Stage IV project reviews. Final Special Provisions shall be sealed by the Engineer in responsible charge. The Consultant shall be responsible for incorporating any specifications provided by ADOT technical sections into the draft and final Special Provisions. ADOT shall review all submittals of Special Provisions and the Consultant will prepare the final Special Provisions.

## **487 Contracts and Specifications Process**

The Consultant shall, under the direction of ADOT, support the Contracts and Specifications process after completion of the Final Submittal stage leading to the complete bid documents as follows:

- A. Promptly answer questions relative to the plans, quantities, and Special Provisions.
- B. Make any necessary corrections to the plans, typical sections, Special Provisions, quantities, notes, etc. as required.
- C. Prepare any addenda required to clarify the work included in the contract documents as requested by the Contracts & Specifications section. The addenda shall be prepared immediately upon request. Addenda may be required based on the project inspection with the assigned ADOT Resident Engineer, questions developed in the pre-bid conference, or conditions discovered by bidders during the bid period.
- D. The Consultant shall, prior to the pre-bid conference be prepared to walk the project with the assigned ADOT Resident Engineer to discuss the plans and details.
- E. The Consultant shall be prepared to attend the pre-bid conference, if one is scheduled, and present an appropriately-sized display showing the project layout, proposed traffic control and construction phasing, and shall be prepared to discuss other constraints so that the potential bidders will be better able to relate to the intent of the construction of the project. The Consultant shall respond to questions related to the plans, details and special provisions.
- F. The Consultant shall be prepared to assist in the analysis of bids, including: determination of reasonableness and justification of cost variances, analysis of original cost estimate compared to contractor bid costs.

## **490 Computer Aided Design and Drafting (CADD) Standards**

ADOT shall retain all rights and ownership of all Electronic Files and Hardcopy Deliverables throughout the Design Phases.

**General Specifications:**

All files to be archived shall conform to ADOT drafting and CADD standards (including CADD file naming convention). Each discipline, (i.e. Bridge, Roadway) shall submit all their files in a folder (with no subfolders) to be archived in a project folder. The current ADOT approved version of Bentley's MicroStation software will be used. All graphic files shall be provided in MicroStation native design file format (.dgn), and contain data in vector format only. Digital Terrain Model (.dtm) files shall be produced with Bentley's InRoads/Site/Survey compatible file formats. Raster data shall not be accepted unless otherwise stated by ADOT. Use of non-MicroStation vector format and subsequent translation of graphic files to the .dgn format shall not be acceptable. No zipped files shall be accepted. All reference files shall be delivered, and are not to be copied into the plan sheet files. All electronic "design sheets" shall include border information and display a fitted "plan view" in View 1. View 1 shall be the final plot view and as such, all appropriate reference files, levels, view attributes shall be displayed. No vector or raster elements shall be outside the border. ADOT cells are not to be modified unless approved by ADOT.

All final Consultant project Electronic CADD data files may be delivered through a File Transfer Protocol (FTP) Site. Alternatively, two (2) copies of the electronic files shall be submitted on CD-ROM/DVD (multiple CD's/DVD's shall be allowed). All final project documentation, electronic files and hard copy shall be packaged separately, labeled and delivered to the assigned ADOT Project Manager, and/or to the Technical Leader as identified below.

All deliverables shall contain an electronic Index of files and a letter of transmittal to the designated areas and all CD's/DVD's must be labeled with the information stated below:

**Identification Label For CD and Case:**

Prepared By:  
Federal Project Number:  
Route:  
Milepost (Beginning/Ending):  
Prefix (Rt, Co, MP) and TRACS Number:  
Project Name:  
Type of Files:  
Creation Date:  
Disc (#) of (total #)

In addition to the requirements stated above in the General Specifications, all designers of ADOT projects shall provide the following information requested by the individual areas. If unclear about items needed for your project, please contact the Project Manger.

*Bridge:*Identification Label

1. Structure Number ( 4 digit number )
2. Structure Name (Apprentice Wash Bridge)
3. Type of work category:
  - a) Major Structure – New Bridge
  - b) Bridge Replacement
  - c) Minor Structure
  - d) Deck Rehabilitation
  - e) Hinge, Deck or Joint Repair
  - f) Barrier Replacement
  - g) Bridge Widening
  - h) Scour Protection
  - i) Seismic Retrofit

*Materials and Geotechnical:*

In addition to the CADD requirements stated in the General Specifications, all Consultants of ADOT Geotechnical projects shall provide the following information to the Project Engineer for ADOT Geotechnical Section:

1. One (1) Electronic Copy of the final Geotechnical Design sheets submitted on CD-Rom.
2. One (1) half-size (11"x17") print of the Geotechnical sealed and signed final design sheets.

*Roadway Engineering:*

See General Specifications.

*Right of Way:*

All R/W plans are to conform to current R/W Plans Standards and Manual.

**Final Task Submittal FINAL R/W PLANS**

When all comments have been addressed, the designers of ADOT projects shall submit the following:

1. Beginning and Ending Mileposts in tenths of a mile.
2. Revised Calculation Book sheets and Point ID sheets, if necessary.
3. An ASCII coordinate electronic file in the following format: Point Number, Northing, Easting, and Description using commas as delimiters. The designers of ADOT projects shall ensure that this file is free of extraneous text such as page numbers, headers, batch commands, and the like. This file shall be such that it can be imported into a COGO program without reformatting by ADOT Right of Way Plans Section. Only numeric numbers shall be accepted.

4. One (1) half-size print of the Final Right of Way Plans set.
5. *Full-size set of Sealed and Signed Mylar's trimmed to 22" x 34".*

*Traffic Engineering:*

Upon Final Design Approval for any and all work that involves Traffic Engineering/Design, the Traffic Engineering Group requires that the following CADD related deliverables be submitted to the Primary Project Manager as indicated in the General Specifications. In addition, a copy of the Letter of Transmittal indicating all Traffic related deliverables have been submitted to ADOT shall be forwarded to the Traffic Engineering Project Manager for approval.

1. All SignCad files shall be submitted in ADOT's current version of SignCad (.SGN).
2. All Design CADD files associated with Traffic Design, including Traffic Signals, Signing, Pavement Marking, Traffic Control, Pre-Design, HES Projects, and Permit Designs, shall be submitted in ADOT's current version of MicroStation 2D format (.DGN)(2D).

*Engineering Surveys (Photogrammetry and Mapping):*

In addition to the CADD requirements stated in the General Specifications, all designers of ADOT projects shall provide the following information, if applicable, to the ADOT Project Manager:

1. Ground Adjustment Factor (G.A.F.).
2. Contour Interval (C.I.).
3. Project Scale.
4. Horizontal and Vertical Datum.
5. Arizona State Plane Coordinate System Zone.
6. Hard copy of reports including any plots.

Based on the Scope of Work, select the items to be delivered:

1. Hard Copies shall consist of the following:
  - a) Field notes.
  - b) Sketches.
  - c) Transit and Level books.
  - d) Plots.
  - e) Reports.
2. (.dgn) file containing graphical representation of the project (i.e. planimetrics and contours).
3. (.3d) file containing graphical representation (i.e. breaklines and random points) to produce the DTM.
4. (.dtm) containing Engineering Surveys approved features that make up a correct surface representation.
5. (.alg) file containing the project alignments. (.rpt) file including curve data from the alignment.
6. ASCII (.csv) files shall contain the following:
  - a) File Header Information:
    - i. Project GAF
    - ii. Project Datum

- iii. Arizona State Plane Coordinate System Zone
  - iv. Basis of Alignment
  - v. Basis of Stationing
  - vi. Basis of Horizontal Control
  - vii. Basis of Elevation
  - viii. Basis of Bearing
  - b) *All Project Control.*
  - c) Section Corners.
  - d) R/W Monumentation.
  - e) Structures.
  - f) Edge of pavement.
  - g) *Centerline and driving stripes.*
  - h) Other features as requested.
7. Record of Survey: When requested, the Record of Survey will be in electronic format (.dgn or .pdf), with a stamped original.
  8. Pictures: Upon request, pictures will be taken for all structures including ends of pipes, headwalls, pipe caps, and any unnatural terrain feature in a .jpg or .bmp file format (check scope of work).

Note: Two (.CSV) files shall be submitted, one containing the RAW survey data and another containing the edited survey data.

If unclear about items needed for your project, please contact the Engineering Survey Section.

#### **ADOT PROJECT MANAGER:**

All survey projects shall be submitted to the ADOT Project Manager and/or Consultant Project Manager for archiving purposes. Additionally, a copy of the project metadata will be submitted to Engineering Survey Section/Location Surveys.

#### *Engineering Surveys (Photogrammetry and Mapping):*

In addition to the CADD requirements stated in the General Specifications, all designers of ADOT projects shall provide the following information to the ADOT Project Manager:

1. *Scanned images.*
2. *Aerotriangulation files.*
3. Orthophotographs produced.
4. Topographic and planimetric mapping.

To facilitate project management, the Consultant will submit project metadata to Engineering Surveys Section/Photogrammetry and Mapping. The metadata can be submitted in a text (.txt) or similar file.

Metadata content should include as a minimum:

1. Complete Tracs No.
2. Route number and/or name.
3. Project description.

4. Beginning and ending mile posts.
5. Project datum.
6. Ground Adjustment Factor (GAF).
7. Arizona State Plane Coordinate System Zone.
8. Aerial photography date and scale.
9. Contour interval.
10. Map Scale.

If unclear about items needed for your project, please contact the Engineering Survey Section/Photogrammetry and Mapping.

**ADOT PROJECT MANAGER:**

All photogrammetry and mapping projects shall be submitted to the ADOT Project Manager and/or Consultant Project Manager for archiving purposes. Additionally, a copy of the project metadata will be submitted to Engineering Survey Section/Photogrammetry and Mapping.

**SECTION 600 - POST DESIGN SERVICES**

ADOT will coordinate all post-design services and will act as the principal initial contact for post-design questions. The Consultant shall be responsible for the post-design services described below. Post-design services will be added to the contract by contract modification.

- A. The Consultant shall be available, within twenty-four (24) hours of notification, to respond to questions in the field that may arise relative to the plans, details, or special provisions during construction.
- B. The Consultant shall review and approve shop drawings, erection procedure plans, and formwork details, review proposals for substitutions or "approved alternates," assist the resident engineer in developing change orders, and provide other engineering services required to facilitate construction of the project.
- C. The Consultant shall appoint a responsible member of the firm to be the contact person for all post-design services; this person shall be continually available during the course of construction for review and updating of design plans.
- D. The Consultant shall make every reasonable effort to process any material presented for review in a prompt manner.
- E. The Consultant may be required to attend the Pre-Construction Partnering Workshop and/or utility coordination meetings.
- F. The Consultant shall submit sealed and properly signed required construction modifications (change orders) of the original design in a hard copy as well as in electronic format as stated in section 1040. Change Orders produced during construction shall be properly sealed and signed by a Professional Engineer, Landscape Architect, or Architect, registered in the State of Arizona, and submitted to the ADOT project manager to be added as part of the record set of plans.



- G. The Consultant shall professionally prepare the As-Built plans for the project based on redlined construction plans provided by the ADOT Resident Engineer. The As-Built submittal shall also include electronic files consistent with ADOT's electronic As-Built process. The Consultant shall follow the steps described in the ADOT Red-Line and As-Built Preparation and Guidelines (12/08/2009) and provide the deliverables described within the document.

## **SECTION 700 - MATERIALS FURNISHED BY ADOT**

### **710 Surveys**

ADOT will provide the following materials, as available:

- A. Previous survey (e.g. control points, DTM, DGN, ALG, etc.).
- B. Vicinity Map(s).
- C. Descriptions and values for ground control monuments.
- D. ADOT State Plane Coordinates Ground Adjustment Factor(s).
- E. Control for aerial maps.
- F. ADOT Publications (publications can be obtained through Engineering Records at ADOT headquarters in Phoenix):
  - 1. CADD Standards.
  - 2. Manual for Field Surveys.
  - 3. Traffic Control Manual of Highway Construction and Maintenance.
  - 4. Manual on Uniform Traffic Control Devices (FHWA).

### **711 Photogrammetry and Mapping**

- A. Previous photogrammetric mapping (e.g. topographic maps, planimetric maps, DTM's, etc.).
- B. Photo mosaics.
- C. Aerial photography.
- D. Flight plans.
- E. Control panel configuration/layout.
- F. ADOT Photogrammetry and Mapping General Specifications.

## **720 Materials Investigation**

ADOT will provide the following materials:

- A. Geotechnical Report if applicable.
- B. Pavement Design Summary & Cost Estimate if applicable.
- C. Pavement Design Report if applicable.
- D. Review of all submitted reports prepared by others for this project.

## **730 Record Documents**

The Consultant shall obtain the following ADOT drawings:

- A. Available "As Built" plans, of existing conditions.
- B. Available right-of-way plans of existing conditions.

## **740 Traffic Data**

The Consultant shall obtain from ADOT the following design traffic data:

- A. Current and design year ADT
- B. K, D, and T factors

## **750 Environmental Studies**

In addition to the Final Environmental documents, ADOT will provide, at the Consultant's request, any available environmental data prepared for the project (such as cultural resource surveys, EOs, investigations).

## **760 Base Sheets**

ADOT will provide the Consultant with one (1) reproducible copy of each of the following base sheets as required for completion of the project plans. For other compatible CADD systems, these items shall be provided on computer CDs.

- A. Roadway Design Section sheet.

- B. New Pipe Summary sheet.
- C. Barrier Summary sheet.
- D. Reinforced Concrete Box Culvert Summary sheet.
- E. Roadside Development Section sheet.
- F. Corrugated Aluminum Pipe Extensions Summary sheet.
- G. Corrugated Steel Pipe Extensions Summary sheet.
- H. Combination Barrier and Pipe Summary sheet.
- I. Cell Libraries (CADD only).
- J. Font Libraries (CADD only).
- K. Face sheet.
- L. List of Standard Drawings sheets.
- M. Traffic Design Section sheets.
- N. Traffic Operations Section sheets.
- O. Right-of-Way Plans Section sheet.

## **770 Final Design Concept Report**

The Final Design Concept Report will be provided to the Consultant.

## **SECTION 1000 - CONTRACT ADMINISTRATION**

Contract Administration includes activities that are common in the administration of a contract; these activities include but are not limited to Contract Proposal, Initial Cost Estimate Negotiation, Project Control, Subcontract Services, Project Related Correspondence, and Quality Control.

### **1010 Arizona Department of Transportation**

ADOT's Project Manager shall:

- A. Conduct ongoing reviews of the Consultant's progress in performing the work and ensure timely comments from the technical units.
- B. Direct design consensus status and team building meetings with all appropriate partners at the start and on a monthly basis during the project development period.
- C. Review the Consultant's billings.

- D. Review and evaluate the Consultant's requests for extension of time and supplemental agreements.
- E. Review all correspondence with public agencies prior to the Consultant's mailing of any correspondence.
- F. Coordinate the distribution of public information with the Communication and Community Partnerships Group.
- G. Provide a focal-point contact for all questions, requests, and submittals.
- H. Coordinate project scheduling with the Consultant, ADOT sections, and ADOT Program and Project Management Section.

## **1020 Consultant**

The Consultant shall:

- A. Establish, furnish and maintain suitable office facilities to serve as the project office for the duration of the project in the location specified in the Consultant's technical proposal.
- B. Maintain an adequate staff of qualified support personnel to perform the work necessary to complete the project.
- C. Establish internal accounting methods and procedures for documenting and monitoring project costs.
- D. Establish and maintain contract administration procedures, which will include supplemental agreements, time extensions and subcontracts.
- E. Include the complete TRACS number and project name on all correspondence related to the contract.
- F. Participate in design consensus, status and team building meetings with all appropriate partners at the start, on a monthly basis during the project development period and as needed to maintain the design schedule. If requested by the ADOT Project Manager, the Consultant shall act as the lead.
- G. The Consultant is responsible for the accuracy and completeness of contract documents and related design prepared under the project. The plans will be reviewed by the project team including representatives of ADOT technical sections for conformity with ADOT procedures and the terms of the contract. Review by ADOT does not include detailed review or checking of design of major components

and related details or the accuracy with which such designs are depicted on the plans.

## **1021 Project Control**

The Consultant shall provide data, in the format specified by ADOT, upon request to monitor costs and manpower and to report progress. A Project Control system should include all activities necessary for the management of the project as shown below.

The project control system may include features to:

- A. Determine and highlight a schedule using a critical path method from initial to final plans and as work progresses.
- B. Identify progress against schedule for each identified work item.
- C. Forecast completion dates from current progress.
- D. Highlight rescheduled work in any area which is out of the required sequence.
- E. Determine any physical area that requires more resources than originally allocated.
- F. Forecast future conflicts in any area.
- G. Provide estimates of time, manpower, and dollars (billing and cost management) required at the lowest work element tracked, based upon current expenditures versus schedule.
- H. Provide the capability of random inquiry concerning the status of any work element in terms of schedule, manpower, and dollars.

## **1022 Subcontract Services**

Due to the nature and scope of the required services, it may be desirable for the Consultant to subcontract portions of the work. However, the subcontracting firms must be approved in writing prior to initiation of any work. The volume of work performed by the subcontractors shall not exceed 49 percent (49%) of the total contract value.

## **1023 Project Related Correspondence**

The Consultant shall furnish written documentation of communications between the Consultant and any party, pertaining specifically to the project, to ADOT for record keeping within one week of the communication. The Consultant is responsible for recording and distributing to the

participants the notes of all meetings pertaining to the project within one (1) week of the meeting.

## **1024 Quality Control**

The Consultant is responsible for the accuracy and completeness of the plans and related design prepared under the contract and shall check all such material accordingly. The Consultant shall have a quality control plan in effect during the entire time work is being performed under the contract. The plan shall establish a process whereby plans, calculations and documents submitted for review shall be clearly marked as being fully checked by a qualified individual other than the originator. Non-compliance will be sufficient cause for rejection of submittal. Periodic Quality Control audits may be performed by the ADOT Project Manager.

The Consultant shall submit the quality control plan to ADOT for approval within fifteen (15) working days of receipt of written Notice to Proceed. The plan shall comply with the requirements of Section 1025. The plan shall address as a minimum: checking procedures, training of employees in quality requirements, and methods of monitoring and documenting quality control activities including reviewing all documents for conformance and providing comments.

## **1025 Quality Control Plan Requirements**

### **A. Identification of key personnel and definition of specific responsibilities:**

The plan will identify, by name, the specific project personnel and their individual responsibilities relative to the project and the Quality Control process.

### **B. Technical review process:**

Technical review shall be distinguished from checking. Checking is for verification of the accuracy of the documents; technical review is for the verification of the overall design concept of the project. As a minimum, technical review will do the following:

1. Determine the adequacy of the design process to achieve the desired goals.
2. Evaluate the general selection and sizing of materials and equipment.
3. Determine if all viable alternatives have been considered.
4. Determine the practicality of the design concept.
5. Determine if legal and physical restraints were considered.
6. Determine if the design theory, concepts, and project layout are logical.
7. Determine applicability of computer programs used.

8. Determine if the technical specifications are sufficiently comprehensive.
9. Determine the constructability of the selected design.

C. Checking procedures:

The checking process should assure that all documents produced, including, but not limited to, plans, reports, calculations, specifications, special provisions, estimates, and schedules, are thoroughly checked by an individual equally competent to the originator of the document to verify accuracy. The process will address resolution of conflict and assure agreement of computer programs and procedures for checking computer input and output. Checking shall not only confirm the accuracy of calculations, but shall include a thorough review of the proper use of Standard Drawings, Drafting Guide, Project Design Guidelines, and other manuals and documents referenced under Section 200.

D. Program to train employees in the quality control requirements:

The training program should provide an opportunity for all project staff to become familiar with the design and the quality control process that will be required on the project. Particular attention should be directed to defining specific individual responsibilities and assuring their understanding.

E. Process to monitor and document quality control activities:

A method for monitoring and documenting the required processes is essential to achieve desired results; this process should easily and quickly verify the entire Quality Control process. The Submittal Required Document Checklist should be developed and coordinated with the ADOT Project Manager to develop a quick reference and periodic review of the submittals by the Consultant and ADOT.

## **1026 Consultant Personnel**

The Consultant's work shall be performed and/or directed by the key personnel identified in the technical/fee proposal presentations by the Consultants. Any changes in the indicated key personnel or the Consultant's officer-in-charge of the work, as identified in the Consultant's proposal, shall be subject to review and approval by ADOT.

## **1027 Site Visit**

The Consultant shall make arrangements to visit the project site, with agency representatives as appropriate (ADOT, FHWA, National Forest and other interested persons), at least two (2) weeks prior to the visit. The visit will be held within fifteen (15) working days of the receipt of written Notice to Proceed, or as otherwise instructed by the ADOT Project Manager. Within

seven (7) calendar days of the site visit, the Consultant shall issue to ADOT a brief written report including observations, discussions, and any questions pertaining to the scope or level of effort of the project. The purpose of the site visit is to acquaint key personnel with the details and features of the project to facilitate the design process. Other visits to the site may be necessary to gather specific information required for the design and/or clearance purposes.

### **1030 Acceptability of the Work**

The plans, design, requested calculations, reports and other documents furnished under the Scope of Work shall conform to "standards-of-the industry" quality. Criteria for acceptance shall be a product of neat appearance, well organized, accurate and complete, technically and grammatically correct, checked in accordance with the approved Quality Control program, and with the designer, maker and checker identified.

### **1040 Design Documentation**

- A. If requested, the Consultant shall submit any design notes, sketches, worksheets, and computations to document the design conclusions reached during the development of the contract documents to ADOT for review.
- B. Structural calculations will only be submitted when requested by the Bridge Group and for specific elements.
- C. At the project completion (immediately prior to the bid advertisement), a final set of project documentation sheets, sealed by a Professional Engineer, Landscape Architect, or Architect, registered in the State of Arizona, shall be submitted to ADOT with the record set of plans.
- D. Project Documentation shall include, but are not necessarily limited to, the following data:
  - 1. Design criteria used for the project.
  - 2. Right-of-Way calculations (including easements).
  - 3. Geotechnical reports for the pavement and/or bridge design.
  - 4. Documentation of decisions reached resulting from meetings, telephone conversations or site visits.
  - 5. Drainage reports.
  - 6. Field survey notes and computations.
  - 7. Calculation of quantities.



- E. Computer-Aided Design and Drafting (CADD) Standards shall be used for all Projects related Deliverables. ADOT shall retain all rights and ownership of all Electronic Files and Hardcopy Deliverables throughout the Design Phase.
- F. During project construction, and as part of the post-design services rendered by the Consultant, any modification(s) ("change orders") shall be prepared by the designer to complement the work condition changes that had occurred; the plans prepared for these new conditions shall be turned in to ADOT PM to be stored with the rest of document in Engineering Records. ADOT will retain all rights and ownership of the Electronic Files and Hardcopy Deliverables throughout the Construction Phase.
- G. During the project construction phase, and as part of the post-design services rendered by the Consultant, any modification(s), (addendums, field redlines etc.) shall be prepared in accordance with the ADOT As Built Procedure as stated in section 600. All Electronic and Hardcopy Deliverables related to post-design addendums and change orders shall be turned in to ADOT for record purposes; change orders shall be sealed by the Professional Engineer, Landscape Architect, or Architect, registered in the State of Arizona, responsible for the modification. ADOT retains all rights and ownership of the Electronic Files and Hardcopy Deliverables throughout the Construction Phase.

## **1050 Value Analysis**

"Value Analysis", also know as "Value Engineering" consists of those tasks performed by a Value Analysis Team in accordance with the Value Analysis Program Manual as referenced in Section 200 and available from the ADOT Value Analysis Section. Any studies or other activities of a similar nature shall not be referred to as "Value Analysis" or "Value Engineering."

The design team is encouraged to recommend value analysis for ADOT standards and specifications, as well as for elements of the project.

## **1051 Value Analysis Team**

The value engineering study will be performed by a value analysis team consisting of ADOT personnel, personnel from consultants or outside agencies, or some combination of these sources. The design team shall cooperate fully with the value analysis team, providing necessary background information for the study. At the discretion of the Project Manager, the design team may be requested to assign one of its representatives to the value analysis team.

## **1052 Design Team Responsibilities**

- A. The design team, upon notification of the approval of a value analysis, shall compile appropriate data for analysis and make a presentation to the value analysis team, in

accordance with the Study Plan prepared by the Value Engineer. The design team shall communicate and cooperate fully with ADOT's Value Engineer and the value analysis team.

- B. It is expected that the elements necessary for a value study can be assembled and delivered by the design team with minimum expenditure of effort and time under its normal design procedures in approximately four (4) working days. The design team will be allowed to budget thirty-two (32) man-hours for data compilation, the presentation, and study response, if appropriate. If the design team is requested to furnish a representative to participate as a member of the value analysis team, additional hours may be necessary. Although costs for value analysis activities are not identified as a separate expense item for accounting purposes, the design team shall report the hours expended and estimated costs of labor and materials to the ADOT Value Engineer for cost tracking and value analysis program evaluation purposes.
- C. In accordance with the Program Manual, the findings and recommendations of the value study will be forwarded to the ADOT Project Manager for review. The Project Manager will review the value analysis recommendations with the project team and respond to the Value Analysis section as soon as practical indicating acceptance, possible acceptance pending further investigation, or rejection of each recommendation. The design team shall implement the approved recommendations of the value study. If significant effort is required, the additional work will be added to the Scope of Work by contract modification.

## **1060 Reviews and Submittals**

- A. Review and coordination of the Consultant's work by ADOT will continue through the project development process. The Consultant may continue the design work while design submittals are being reviewed by ADOT. Doing so however in no way relieves the Consultant of the responsibility to ensure the incorporation of review comments into the design, nor does it entitle the Consultant to any additional design fees as a result of making changes due to review comments.
- B. Partnering Workshops:
  - 1. If requested by ADOT, the Consultant shall participate in joint progress meetings and consensus sessions with other designers on the corridor.
  - 2. The Consultant shall participate in a Construction Partnering Workshop after the project has been awarded and prior to the start of construction.
- C. Submittals for review shall be made when the studies and/or plans have been developed to the following levels of completion:

1. Quality Control Plan.
  2. Stage I design.
  3. AASHTO Report.
  4. Stage II design.
  5. Stage III design.
  6. Stage IV design.
- D. The project may be subject to a constructability review. The Resident Engineer or other assigned District representative will be the leader of the constructability review which would normally occur after the Stage III submittal and before the Stage IV submittal.
- E. Copies of review submittals and finalized documents shall be distributed by the Consultant in accordance with the Distribution List maintained by the Statewide Project Management Section (see Appendix C) or as per the ADOT Project Manager's instructions. The appropriate name for each position may be obtained from the ADOT Project Manager upon request one week prior to any submittal deadline. All deliveries shall be by hand or overnight courier or as directed by the Project Manager.
- F. All plans and cross sections shall be half-size black and white sheets. A separate CD-ROM/DVD containing the CADD (Microstation) design files used to develop the plan sheets, will be required to be submitted with the final set of plans as specified in Section 1040.

## **1061 Environmental Reports (Intentionally Left Blank)**

## **1062 Stage I Design Submittal**

An informal review and discussion of the project shall be held prior to the Stage I review submittal. The meeting shall take place as soon as the Consultant has established pre-initial roadway alignment, typical roadway sections, and a tentative plans layout for the project.

The attendees shall consist of the Consultant, the assigned design team including ADOT staff involved in the project design, the ADOT Project Manager and other concerned personnel invited by the ADOT Project Manager.

- A. The following material shall be developed and submitted to the ADOT Project Manager for review:

1. Initial typical roadway sections
2. Initial roadway plan and profile sheets at the scales set in Section 410.
3. Tentative plans layout
4. Initial environmental mitigation measures
5. Request for utility designation services
6. Two copies of all plans and cross sections; one set shall be half-size black and white sheets and the other set in PDF format.

### **1063 Stage II Design Submittal**

The Geotechnical Report shall be submitted to ADOT for review and approval a minimum of fifteen (15) calendar days prior to the Stage II Design Submittal.

In addition, the following material shall be developed and submitted for review:

1. Typical roadway and detour sections.
2. Final roadway geometry and preliminary roadway and detour plan and profile sheets.
3. Location of existing utilities and identification of initial utility conflicts.
4. Utility report.
5. Preliminary R/W and easement requirements.
6. Preliminary roadway drainage plans and details and Initial Roadway Drainage Report.
7. Bridge Drainage Report.
8. Bridge Selection Report.
9. If required, draft applications for environmental permits including preliminary input for Section 404 permit.
10. Any significant change in engineering data supporting previous environmental decisions or applications.
11. Preliminary summary of required environmental mitigation measures.
12. Preliminary Landscape Architectural plans with proposed sources of power and water.
13. Preliminary development of intersection plans including basic geometry and channelization.

14. Preliminary layouts for proposed retaining and sound barrier walls.
15. Preliminary construction sequencing plans.
16. Final Geotechnical Report.
17. Final survey information.
18. Initial quantities and cost estimate.
19. Preliminary roadway cross sections at one hundred (100) ft. intervals, as a minimum, with additional sections at breaks in the terrain. See Section 440, Roadway Design.
20. Preliminary summary of earthwork quantities.
21. Two copies of all plans and cross sections; one set shall be half-size black and white sheets and the other set in PDF format.

#### **1064 Stage III Design Submittal**

An office review and field review will be held following submittal of the Stage III plans to review the proposed roadway alignments and bridge site. See Section 410 of this document for field review staking requirements.

In addition, the following material shall be developed and submitted for review:

1. Final typical roadway and detour sections.
2. Pre-final roadway and detour plan and profile sheets.
3. Identification of final utility conflicts and preliminary plans of utility installations and/or re-locations to be included in project construction.
4. Pothole data made available to utility companies.
5. Utility report.
6. Final R/W and easement requirements.
7. Pre-final roadway drainage plans and details and Final Roadway Drainage Report.
8. Completed applications for environmental permits including final input for Section 404 permit.
9. Any significant change in engineering data supporting previous environmental decisions or applications.
10. Final summary of required environmental mitigation measures.
11. Pre-final intersection plan sheets.

12. Final construction sequencing plans.
13. Pre-final layouts for retaining and sound barrier walls.
14. Preliminary landscape architectural plans, summaries and details, and proposed sources of water and power.
15. Preliminary design sheet with index and general notes, summary sheets and special details.
16. Preliminary summary sheets.
17. Preliminary special details.
18. Preliminary bridge structure plans.
19. Preliminary retaining wall and sound barrier wall design plans.
20. Preliminary traffic control plans.
21. Preliminary pavement marking and signing plans.
22. Preliminary traffic signal plans.
23. Preliminary lighting plans.
24. Preliminary erosion control plans, summaries and details.
25. Preliminary special provisions including ADOT Stored Specifications.
26. Preliminary quantities, cost estimate and bidding schedule.
27. Preliminary construction schedule in bar chart format.
28. Preliminary roadway cross sections at one hundred (100) ft. intervals, as a minimum, with additional sections at breaks in the terrain. See Section 440, Roadway Design.
29. Preliminary summary of earthwork quantities.
30. Preliminary Utility Special Provisions.
31. Two copies of all plans and cross sections; one set shall be half-size black and white sheets and the other set in PDF format.

## **1065 Stage IV Submittal**

Submittals at this level are required due to noncompliance with the Scope of Work or ADOT's review comments, the work shall not entitle the Consultant to any additional design fees.

The Consultant shall prepare and submit to U & RR Section, a Utility Clearance Letter in the style and manner as outlined in the *Utility Coordination Guide for Design Consultants*. The clearance letter shall be sent before the Final Submittal is made.

In addition, the following final material shall be completed, checked and submitted for review:

1. Design sheet(s) with index and general notes.
2. Summary sheets.
3. Special details.
4. Typical roadway and detour sections.
5. Roadway and detour plan and profile sheets.
6. Drainage plans and details.
7. Intersection plans and details.
8. Construction sequencing plans.
9. Traffic control plans.
10. Traffic signal plans.
11. Signing and pavement marking plans.
12. Lighting plans.
13. Bridge plans.
14. Retaining wall and sound barrier wall design plans.
15. Landscape Architectural plans and details.
16. Utility installation/relocation plans and details to be included in project construction.
17. Utility report.
18. Utility Special Provisions.
19. Utility relocation schedule and costs.
20. Erosion control plans.
21. Roadway cross sections (see Section 440, Roadway Design).
22. Final summary of earthwork quantities.
23. Quantities, cost estimate and bidding schedule (provide the work done using Microsoft Excel in one hard copy and another in a CD-ROM).
24. Special provisions (provide hard copy and CD-ROM using Microsoft Word).
25. Construction schedule.
26. Environmental permits.
27. Summary of environmental mitigation measures and disposition.
28. Final design calculations.

29. Two copies of all plans and cross sections; one set shall be half-size black and white sheets and the other set in PDF format.

**NOTE:** The ADOT technical reviewer may require checked computations and checked data on the plans for all of these items prior to submittal.

ADOT's review of the submittal will include technical content, incorporation of previous comments, and completion of design and details, as well as:

1. Conformance with ADOT requirements.
2. Completeness of the contract documents.
3. Compatibility of plans, specifications, and special provisions.
4. Coordination between disciplines, phases, and outside parties.
5. Clarity of the contract documents.
6. Consistency of presentation.

## **1066 Final Submittal**

The following material shall be submitted for completion of the project:

1. A complete reproducible set of sealed and signed contract document originals necessary to construct the road and/or bridge improvements identified in the contract.
2. A complete sealed and signed reproducible set and one copy of special provisions to cover design items not identified in the ADOT Standard Specifications for Road and Bridge Construction, current edition.
3. The Consultant shall provide a copy, in electronic version, of the CADD design files used to create all plan sheets as specified in Section 1040 and 490. The Consultant shall also provide a separate CD/DVD containing all plan sheets, properly sealed by a Registered Engineer, in PDF format. Filenames shall conform to the format provided by ADOT in section 490 and/or required by any ADOT technical section.
4. Final and complete quantity summaries and cost estimates.
5. An estimate of the contract time for the project construction.
6. Final survey computations and original field books.
7. Approved environmental permits if required.



8. A reproducible set of earthwork cross sections by station showing the plotted roadway template superimposed on the plotted natural terrain (see Section 440, Roadway Design).
9. A reproducible set of final earthwork quantities, calculations and overall summaries.
10. Return any documents and other materials provided for use on the project.

**NOTE.-** The Consultant Project Manager will make sure that the printed copies comply with the following list:

1. All seals must be of reproducible quality and all signatures in black ink.
2. All final plan sheets shall be trimmed to 22" by 34".
3. All final plan sheets shall be printed on 20 pound vellum not less than 3 mil nor more than 5 mil.
4. Printed plan sheets shall be black printing only.
5. Do not use paste-ups, tape or sticky back.
6. Do not use pencil on final drawings.

All review submittal prints of the construction plans shall be clearly stamped "PRELIMINARY - NOT FOR CONSTRUCTION". The percentage of completion and date submitted should be clearly evident. Failure to comply may be cause for rejection of the submittal. Only the final approved plans shall be properly sealed by an Arizona Registered Professional Engineer and issued without the above stamped notation.